

# Wind Power Development Issues from an Electric Power Perspective: Electrical and Institutional

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# Wind Power's Natural Characteristics

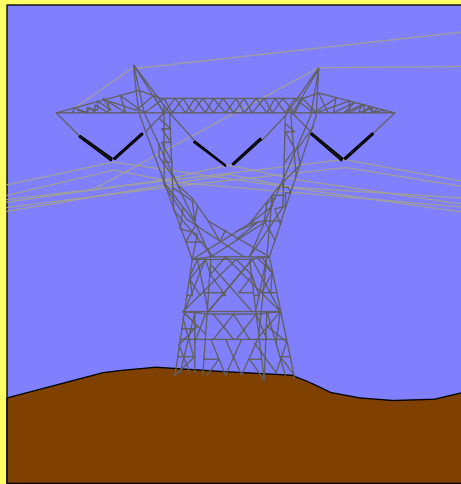
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- **Remote:** Wind resources often distant from major markets
- **Variable:** Plant output varies with variations in the wind
- **New:** Operators more comfortable with established power technologies

*Key Issue: Should wind be disadvantaged by its natural characteristics ?*

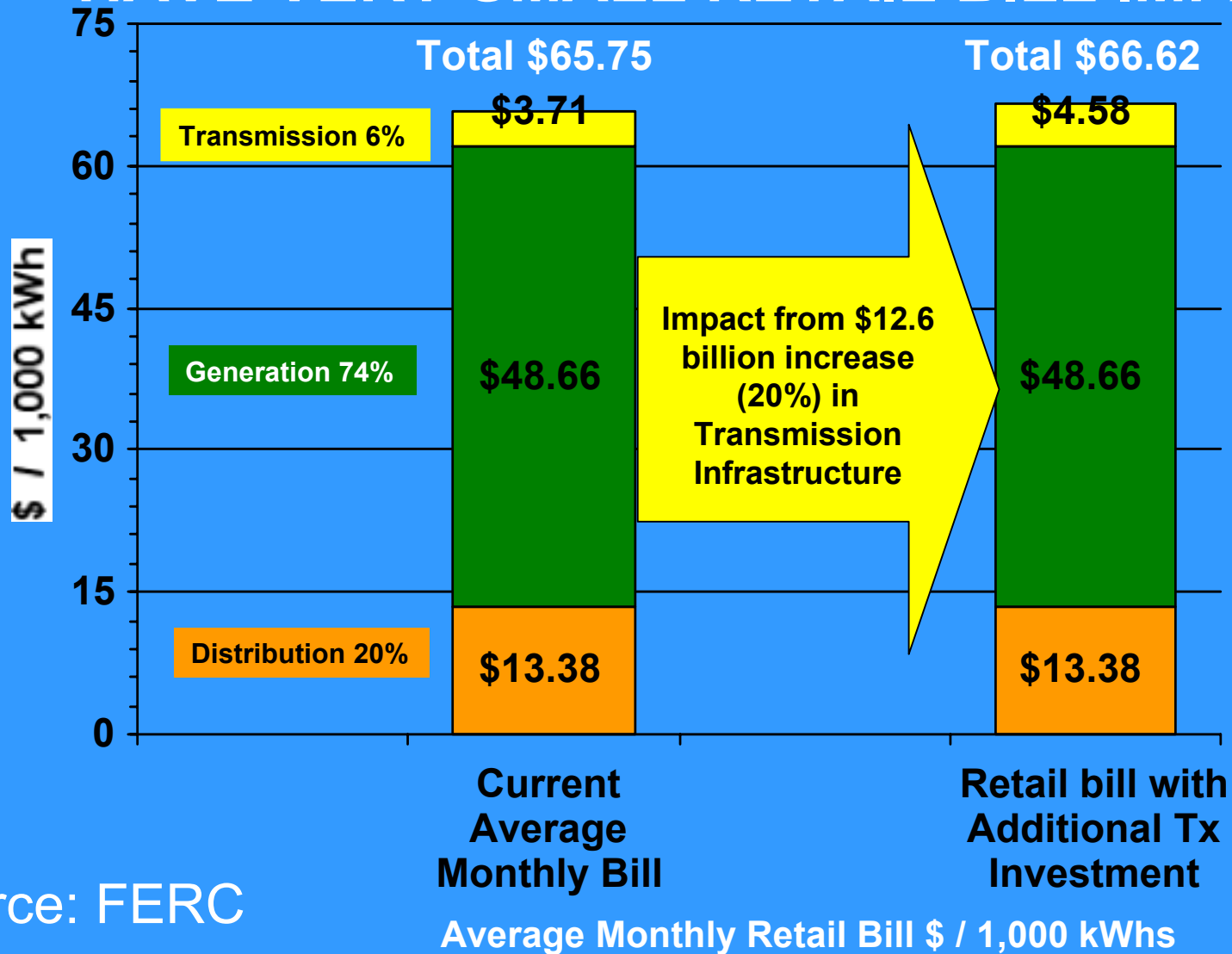
# ***Remote:*** Transmission is Required

- *New Transmission:* siting and approval highly contentious
- *Cost Allocation:* wind plant or overall system?
- *Return on Investment:* commensurate with risk?
- *Landowners Compensation:* revenue stream?



***Key Policy Issue: Is the transmission system a common carrier operating in the public interest ?***

# LARGE TRANSMISSION INVESTMENTS HAVE VERY SMALL RETAIL BILL IMPACTS



Source: FERC

## ***Variable:***      Transmission Access

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### Firm Transmission Rights

- Blocks for specified times
- Underutilized by wind
- Too costly

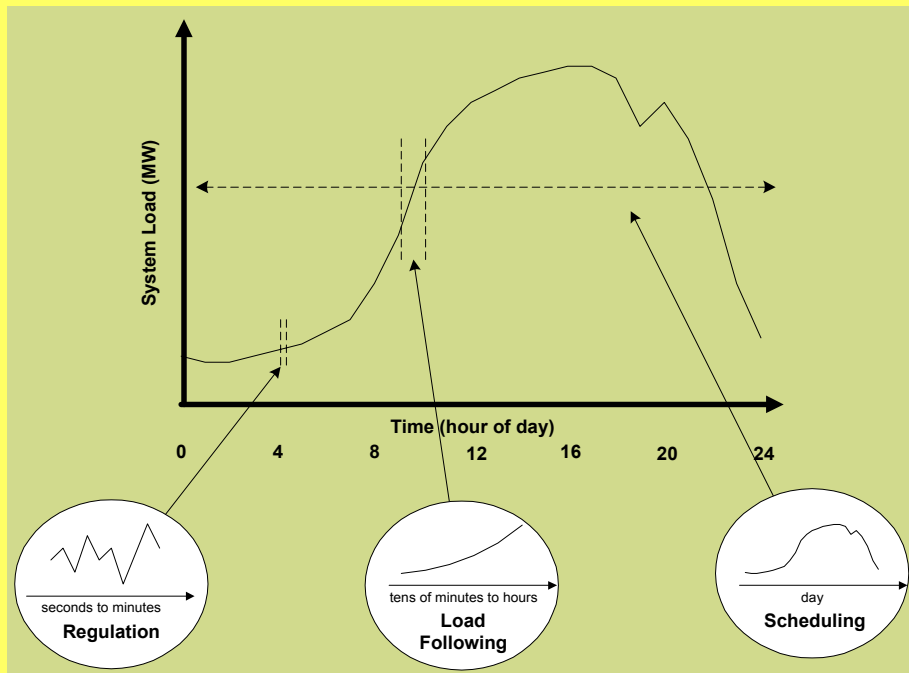
### Non-Firm Rights

- Can be curtailed, but often OK for wind
- Not available long-term
- Insufficient assurance

Middle ground? Flexible-firm?

Wind-plant financing requires reasonable assurance of path to energy marketplace

# Variable: Power-System Operation Impacts



- Regulation -- seconds to a few minutes -- similar to variations in customer demand (loads)
- Load-following -- tens of minutes to a few hours -- usage follows predictable patterns, wind less so

- Scheduling and commitment of generating units -- one to several days -- wind impacts unclear



Wind controlled by nature, not power-plant operators!

# ***Variability*** Can Increase Operating Costs

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- Committing unneeded generation
- Scheduling unneeded generation
- Allocating extra load-following capability
- Violation of system performance criteria
- Increased cycling operation
- **These are reflected in *ancillary services* costs**

Incremental cost added by wind's variability:  
Is it  $\sim 0.1\text{¢/kWh}$  or  $\sim 1\text{¢/kWh}$ ?

# ***New:*** Contrasting Approaches to Change

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**Europe** Wind power is environmentally preferred.  
How can we best accommodate it within the existing power system?

**U.S.** How can we integrate wind into the existing system with minimal impact on traditional rules and procedures?

Wind needs fair -- not preferential -- treatment in electricity-services markets. This is most likely with leadership from the public-policy sector.



# Who Should Take the Lead?

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## Power Utilities? No

- Main job: Keep the lights on!
- Natural aversion to change

## Legislators and Regulators?

- Encouragement of wind and other renewables is a public policy issue



***Bottom Line:*** States can make a commitment to wind power without fear of breaking the bank!